Revision of the Scarabaeidae: Anomalinae
1. The Genera Occurring in the United States and Canada
(*Coleoptera*)

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It appears necessary in a consideration of the generic arrangement of this subfamily that we remember that taxonomic divisions above the species are necessarily artificial, with no objective existence, and are formed largely as a matter of convenience. Nonetheless, an organized taxonomy demands a certain stability based on the work of previous authors, and while their arrangements cannot be ruled sacrosanct merely on a basis of age or previous acceptance, such factors should not be lightly dismissed.

In the Anomalinae we find an exceptionally large and remarkably interrelated group of species. Except for a relatively few genera, with some that may be intermediate to adjacent subfamilies, the Melolonthinae and Rutelinae, it is often difficult or impossible to separate genera in a manner consistent with the usual practice of assembling species only when they share several characters reasonably disparate to the species assembled in other genera. Despite a number of variable and distinctive characters, intermediates are the rule, not the exception.

A veritable wonderland of generic and subgeneric names have been proposed in the subfamily. A strict application of what most systematists would consider necessary to a valid generic grouping would synonymize a majority of these into the single genus *Anomala*, with thousands of species, worldwide, and dozens, if not even hundreds of secondary homonyms.

This, most certainly, would not be more convenient, and it would scarcely contribute to the ease of identification. Compromise, with a minimum of violence to a few questionable, but nonetheless long-established and widely-used genera probably becomes necessary. However, it is also obvious that a number of the proposed groupings were without true value from their inception, merely following in the mould of an early-day taxonomy that regarded any large genus as unmanageable until infinitely divided, no matter how precariously.

We believe the following best represents the status of the Anomalinae of our area:

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TRIBE ANOMALINI

ANOMALA Samouelle 1819:191. Type species: *Scarabaeus aeneus* DeGeer, 1774, Arrow designation, 1917:126.

syn. *Anomalepta* Casey 1915:8. Type species: *Anomala semilivida* LeConte, 1878, Machatschke designation, 1957:30.

syn. *Anomalopus* Casey 1915:40. Type species: *Anomala rhizotrogoides* Blanchard, 1850, Casey designation, 1915:40.

syn. *Blitopertha* Reitter 1903:85. Type species: *Melolontha lineata* Fabricius, 1798, Arrow designation, 1917:127.

syn. *Callistethus* Blanchard 1850:198. Type species: *Mimela auronitens* Hope, 1835, Arrow designation, 1917:127.

syn. *Hemispilota* Casey 1915:45. Type species: *Melolontha lucicola* Fabricius, 1798, Machatschke designation, 1957:30.

syn. *Oliganomala* Casey 1915:38. Type species: *Strigoderma exigua* Schwarz, 1878, monobasic.

syn. *Pachystethus* Blanchard 1850:201. Type species: *Popillia vidua* Newman, 1838, monobasic.

syn. *Paranomala* Casey 1915:12. Type species: *Melolontha binotata* Gyllenhal, 1817, Machatschke designation, 1957:31.

syn. *Phyllopertha* Stephens 1830:223. Type species: *Scarabaeus horticola* Linnaeus, 1758, Arrow designation, 1917:126.

syn. *Rhombonalia* Casey 1915:5. Type species: *Anomala cavifrons* LeConte, 1867, Machatschke designation, 1957:31.

syn. *Rhombonyx* auctorum (not *Rhombonyx* Hope 1837:106). Type species: *Melolontha holosericea* Fabricius, 1787, Arrow designation, 1917:126.

syn. *Spilota* Burmeister 1844:266. Type species: *Melolontha marginata* Fabricius, 1792, Arrow designation, 1917:126.

Only the synonyms with application in our area are included; many others are necessary in other sections of the world. All have been synonymized previously, however several are still accepted and in present use by some systematists.

Blitopertha Reitter and the much older *Phyllopertha* Stephens must be included because of our introduced species, *Anomala orientalis* Waterhouse, which is variously placed in one or the other. Other species included in the genera are Asiatic and European, though species from Mexico and Central America have been included. Both genera were established on a combination of characters that have been subject to a confusing emendation and change by almost every author that has used them. No single character is common to all species usually included, and all are found duplicated in species not included, where they are sometimes carried to an even greater extreme. To compound this confusion, most authorities have failed to agree on their lists of species properly belonging in the two genera.

Our introduced species, *orientalis*, does not differ in any material

way from our native species, and can be separated on characters of no more than species-level significance.

Spilota Burmeister, *Callistethus* Blanchard and *Pachystethus* Blanchard are all largely based on the development of a prominent intermesocoxal process. This might have a certain validity for the species with the most extreme development, except that there is no place where an arbitrary limit might be placed logically in a perfectly intergraded series. Moreover, the character also appears in some *Strigoderma* and in species placed in *Epectinaspis*. The three genera have also been subject to varying application and have never had universal acceptance.

The type species of *Callistethus* is of Himalayan origin, and American species probably should never have been assigned to the genus, however Machatschke, 1957:93, somehow, and quite mistakenly gave *Melolontha marginata* Fabricius as the type, crediting the designation to Arrow 1917:127, whereas Arrow actually designated *Mimela auronitens* Hope as the type, and designated *Melolontha marginata* Fabricius as the type of *Spilota*, which immediately preceded *Callistethus* in his list. But Machatschke, 1957:92, also gives *marginata* as the type of *Spilota*, thus incorrectly indicating the same species as the type of both genera.

Among our own species sometimes variously placed in one or another of these three genera, such as *marginata* Fabricius, the intermesocoxal character is quite variable, from a prominent boss to a large porrect process, and selected specimens might be fitted into each of the three genera.

Unfortunately, this forces the change of the name of a distinctive Florida species described by Mark Robinson, his name becoming a secondary homonym of *floridana* Casey 1915:33. We propose:

Anomala robinsoni, new name, for *Pachystethus floridana* Robinson 1941:133.

A majority of the Casey names were proposed as subgenera, almost entirely on characters of merely species-level importance, and admittedly in an attempt to fraction a large genus. But whether as genera or subgenera, merely adding species from no greater distance than Mexico and Central America immediately demonstrates the lack of validity of his groupings.

Inexplicably *Oliganomala* Casey was misplaced as a synonym of *Strigoderma* by Machatschke 1957:139 and 1972:216, possibly on the basis of the fact that the unique species, *exigua*, equally inexplicably was described as a *Strigoderma* by Schwarz, although it met none of the key

criteria. Casey, 1915:38, made it clear it definitely was not a *Strigoderma*, but the characters cited are not of sufficient importance to justify its separation from *Anomala*.

The genus *Rhombonalia* Casey has had a certain acceptance, however, and for some time we struggled to maintain the concept, since it is based on a notable character, the simple protarsal claw, and does include an obviously closely-related group of species. But, it would necessarily need enlarging to include other species with the same character and eventually breaks down in a way similar to the case of genera previously discussed. The simple protarsal claw is highly variable and there is no point in an intergrading series where it may be established. Moreover, it was found that even *cavifrons* LeConte, the type, may have distinctly cleft claws not too uncommonly, and that the simple claw occurs occasionally in many of our species. It is moderately common in one species that rather obviously should not be assigned to the genus. Finally, a species that is very closely related to *cavifrons* in its other major characters almost always has cleft claws. Other characters that have been cited for the genus proved valueless, and it clearly becomes necessary to accept the judgment of those who had already reduced the name to the synonymy.

STRIGODERMA Burmeister 1844:310. Type species: *Strigoderma sulcipennis* Burmeister, 1844, Casey designation, 1915:48.

syn. *Alamona* Casey 1915:61. Type species: *Alamona parviceps* Casey, 1915, Casey designation, 1915:61.

syn. *Strigodermella* Casey 15:59. Type species: *Melolontha pygmaea* Fabricius, 1798, monobasic.

Considering the entire genus and its separation from worldwide Anomalinae, the definition is far from satisfactory, with no single character that is not duplicated in other genera, both in the Americas and in the Old World. Placement in the genus depends on general habitus almost as much as on any distinct character, while the assignment of a number of intermediate species is entirely arbitrary. Also, several Asiatic species would have to be included in the genus by any definition except distribution. Nonetheless, in our area the genus is easily distinguished on the characters noted in the key. It has had a very long-standing acceptance in the literature, with many species described in the genus, and it would only create greater confusion to return it to *Anomala*, regardless of its weakness.

However, the Casey attempt to split the genus with two additional genera is indefensible at any level. The small justification the genera

had when applied to our few species disappears entirely with the addition of species from south of our borders.

Alamona has been misplaced by Blackwelder, 1944:242, as a subgenus and synonym of *Anomala*, but does not belong with that series at all, being a typical Strigodermid.

TRIBE ANISOPLIINI

ANOMALACRA Casey 1915:10. Type species *Anomalacra cuneata* Casey, 1915, monobasic.

While this genus has been synonymized with *Anomala* by Machatschke, 1957:30 and 1972:83, and there has been confusion as to the species belonging in the group, in the present state of our knowledge it is a very distinct and valid genus. It is closely related to the tropical *Callirhinus*, with the clypeus remarkably thinned and the labrum reduced and withdrawn posteriorly. These characters are also common to the Old World Anisopliini, to which Tribe it would necessarily be assigned.

Charles Schaeffer described our first North American species as *Anomala clypealis*, and despite its remarkable differentiation from other *Anomala* the species is still found assigned to that genus in all published lists, but it must be reassigned to *Anomalacra*.

TRIBE POPILLIINI

POPILLIA Serville 1825:367. Type species: *Trichius bipunctata* Fabricius, 1787, Arrow designation, 1917:58.

Represented in our area by the single introduced species, *Popillia japonica* Newman, although the genus is large and diverse. It is primarily an Asiatic and African development, and has elements of being parallel to the *Strigoderma* development in the Americas. It is generally given a separate Tribal status, however, this may be questionable as strong intergradation to the Anomalini certainly exists.

TRIBE **Lepothopliini,** new Tribe

LEPTOHOPLIA Saylor 1935:132. Type species: *Leptohoplia testaceipennis* Saylor, 1935, monobasic.

This genus is apparently intermediate to the Melolonthinae where it was originally placed as belonging with the Hopliini. Disagreement as to its relationship still exists, however we believe it belongs in the Anomalinae, where it was reassigned by Howden and Hardy, 1971:337.

The very distinctive tumid and penicillate ligula; the exceptionally thick anterior face of the clypeus, some two or more times as thick as normal in the Anomalinae; the obsolescent epipleurae; and the reduction of the minor protarsal claw to half or less the length of the the major claw indicate a disparity sufficient for the erection of a separate Tribe. Withal the major differences, the genitalia are of the generalized anomaline type, closely similar to *Anomala binotata* and *flavipennis*.

KEY TO THE GENERA OF ANOMALINAE OF THE UNITED STATES AND CANADA

1. Ligula and undermouth parts essentially glabrous, with no more than a a few distant hairs, or, rarely, with some close-set flexuous hairs posteriorly 2
   Ligula penicillate, with thick erect bristles; California (Imperial Valley) ..... *Leptohoplia*
2. Clypeus anteriorly thickened, with apical face more or less vertical, rounding under or sloping forward to distinct labrum beneath 3
   Clypeus, as viewed from side, apically reflexed and thinned, without thickened anterior face; labrum withdrawn and not visible; Arizona ..... *Anomalacra*
3. Basal pronotal margin posteriorly rounded or sinuate, always projecting backward over scutellum 4
   Scutellum projecting forward into an arcuate emargination of basal pronotal margin; Eastern States, 1 introduced species ..... *Popillia*
4. Mesosternal epimera antero-dorsally raised and swollen, narrowly projecting before elytral humeri; pronotum subquadrate, distinctly narrower than elytra; elytra more or less tapering posteriorly from near humeri ..... *Strigoderma*
   Epimera reduced, obliquely rounding under covering humeri; pronotum obviously broader than long, as broad as elytra or nearly; elytra widest near middle or toward apex ..... *Anomala*

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FREDERICK VALENTINE MELSHEIMER, PARENT OF AMERICAN ENTOMOLOGY. Robert Snetsinger, 86pp. (Melsheimer Entomological Series, No. 12.), 1973. Available from the Entomological Society of Pennsylvania, 106 Patterson Building, University Park, Penna. 16802. $3.75 plus $.25 for mailing.

Although most Americans prefer to consider Thomas Say as the male parent of entomology in the United States, F. V. Melsheimer certainly played a prominent role in the early history of the science. This volume contains a brief biography, followed by a facsimile reproduction of Melsheimer's catalogue of the insects of Pennsylvania.—*Editor.*